QUANTITATIVE SIMULATIONS OF MST VISUAL RECEPTIVE FIELD PROPERTIES USING A TEMPLATE MODEL OF HEADING ESTIMATION.

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We previously developed a template model of primate visual self-motion processing that proposes a specific set of projections from MT-like local motion sensors onto output units to estimate heading and relative depth from optic flow (Perrone, JOSA, 1992; Perrone & Stone, Vis Res, 1994). At the time, we showed that that the model output units have emergent properties similar to those of MSTd neurons (Stone & Perrone, Neurosci Abstr, 1994), although there was little physiological evidence to test the model more directly. We have now systematically examined the properties of the model using stimulus paradigms used by others in recent single-unit studies of MST: **1) 2-D bell-shaped heading tuning.** Most MSTd neurons and model output units show bell-shaped heading tuning (Duffy & Wurtz, J Neurosci, 1995). Furthermore, we found that many model output units and the finely-sampled example neuron in the Duffy-Wurtz study (their Fig. 12) are well fit by a 2D gaussian ($\sigma \sim 35°$, $r \sim 0.9$). The bandwidth of model and real units can explain why

Lappe et al. (J Neurosci, 1996) found apparent sigmoidal tuning using a restricted range of stimuli (±40°). **2) Spiral Tuning and Invariance.** Graziano et al. (J Neurosci, 1994) found that many MST neurons appear tuned to a specific combination of rotation and expansion (spiral flow) and that this tuning changes little for ~10° shifts in stimulus placement. Simulations of model output units under the same conditions quantitatively replicate this result. We conclude that a template architecture may underlie MT inputs to MST.

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